ADVANCES IN UNDERSTANDING AND MANAGING ACID SOILS IN TROPICAL SOUTH AMERICA

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ABSTRACT

Over the past decade, knowledge concerning the nature of acid soils in tropical South America has increased and led to the development of improved technologies for their management. In the early eighties, the International Center fo Tropical Agriculture in Colombia (CIAT), in association with the Brazillian Savanna Agricultural and Animal Research Center (EMBRAPA-CPAC), carried out a digitalized land systems study over much of the region. This permitted an unprecedented degree of analysis of its climates, landscapes and soils; the study showed that 85% of the region has acid soils. It was also seen that natural vegetation pattern follow unseable ambient energy regimes, which are equally critical for crop growth. The over-all conceptual approach of that study has been adopted by the International Soil Science Society's initiative, the World Soil and Terrain Digital Data Base project, SOTER. Parallel agronomic research on Al toxicity, has resulted in an improved equation for liming acid soils to correct that problem. Work at EMBRAPA-CPAC later suggested that subsoil Ca deficiency was also a serious limiting factor to root growth. A more recent and detailed land resource study of the Geo-Economic Region of Brasilia, has shown that there is a Ca/Mg imbalance in the soils under the predominant savanna vegetation of that region, compared to normal ratios under the lesser inclusions of forests. This would warrant further research. That study also indicated that anion exchange capacity may be as high as cation exchange capacity in some of the soils which has a considerable implication for the management of amendments and fertilizers. An anion exchange capacity methodology was developed that is suitable for studying the effects of Ca^{2+}, SO_4^{2-} and Cl^- movements in those soils. There has also been a considerable increase in knowledge on other soil problems. The use of locally available phosphate rock sources, either for direct application or in partially acidulated formulations, could provide a lower-cost solution to ameliorate phosphorous deficiency in some circumstances. Many other soil nutrient problems are found in the region, and technologies both at the soil survey and field experimentation level, have been developed to speed their identification. Looking to the future, additional research on the movement of nutrients down the soil profile could result in

innovative methods for correcting subsoil anomalities. The recently developed differential equation to estimate fertilizer response curves, should lead to more economical fertilizer practices, and the @World Soil and Terrain Digital Data Base project@, will undoubtedly prove an invaluable research tool to further knowledge on the acid soils of the region.